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IS THE NAVY'S MINE WARFARE POSTURE BANKRUPT?

by

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Major, United States Army

A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Operations.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

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IS THE NAVY'S MINE WARFARE POSTURE BANKRUPT?

CHAPTER I

INTRODUCTION

"The U.S. Navy's plan to develop and utilize mine warfare as an element of its force posture is, at best, ambiguous." ¹

The purpose of this paper is to examine the validity of the accusation embedded in the above quote. Does the Navy, as implied above, acknowledge the very real threat of mine warfare directed against the United States and its friends and allies, but refuse to confront the gravity of the threat by taking the appropriate measures to address it?

Chapter II provides an overview of mine warfare, followed by a description of the weaponry and the countermeasures. Chapter III describes examples of recent U.S. Navy encounters with mine warfare. Chapter IV describes a scenario which, if it were to happen, would either validate or condemn the Navy's posture. Chapter V addresses the principal arguments for and against the title question. Finally, Chapter VI draws conclusions and offers recommendations.

CHAPTER II

MINE WARFARE CAPABILITIES THE WEAPONRY AND COUNTERMEASURES

"When deployed effectively, (mines) can allow an operational commander to concentrate his forces elsewhere in other key maritime areas. And as history has shown, minefields have a psychological impact out of all proportion to their actual physical threat."

ADM Sir Julian Oswald*

Belligerents have exploited the capabilities of the underwater mine ever since the Crimean War. Mines are simple to design, simple to manufacture, and simple to employ. Mines can shift the balance of naval forces in a theater by allowing one commander to better position his forces than he could otherwise, limit the maneuver of his opponent, or both. Mine warfare (MIW) consists of two distinct branches: mining operations and mine countermeasures (MCM) operations. Even the requirements of MCM operations appear relatively simple -- locate the mine, then disable or destroy it. Recent technological advances make MCM appear simpler yet, given state-of-the-art sonar equipment and remotely operated vehicles (ROVs) capable of relaying information to the mine countermeasures vessel (MCMV), placing demolition

charges, and moving to a safe location in order to stand-off and destroy the mine.

Even the most primitive of mines have, however, the ability to modify geography -- that is, to alter the geographic constraints under which a navy fights and through which all ships sail. In the words of one admiral, "The mine is the only weapon of naval warfare ... capable of altering geographic circumstances by making certain areas impassable to ships. Thus an area which has been declared dangerous because of mines is usually treated with great respect and is avoided as though it were land."³

The opening quote of Chapter I is stated more kindly than many throughout the fleet believe is appropriate. The MIW posture of the Navy is an easy target for superficial analysis and criticism. Several facts provide the background for any discussion of U.S. capabilities in MIW:

(1) the Soviet Navy, with a long history of conducting MIW successfully, has mine stockpiles estimated at anywhere between 250,000 and 400,000 (estimated to be ten times the U.S. inventory) and has more than 300 ships dedicated to MCM ⁴;

(2) as the operations in the Persian Gulf have demonstrated, even a few antiquated mines laid by a third-rate naval power can require a response by maritime powers vastly out of proportion to the cost and the scale of the threat; and

(3) a belligerent need not actually lay any mines -- only claim to have done so -- to paralyze any shipping in the area.⁵

Any credible threat requires the same response, regardless of the validity of the claim.

Weaponry. The placing of sea mines to delay, disrupt, re-route, or sink ships constitutes a minefield, which is characterized as offensive, defensive, or protective.

- An offensive minefield is laid in enemy-controlled waters. Although dangerous to lay, this provides the operational commander a means of influencing an operation without the risk of immediate escalation.

- A defensive minefield is laid in waters not controlled by either belligerent. This is normally done along shipping routes or at choke points that the enemy is expected to transit.

- A protective minefield is laid in friendly waters to provide an element of protection to ports or coastal traffic.

All mines are triggered by either contact or influence. The degree of sophistication accorded a mine design is primarily a reflection of the triggering mechanism.

- A contact mine is triggered by physical contact with a vessel, causing a fuze mechanism to ignite an explosive charge.
- An influence mine is triggered by a sensor detecting:
 - a vessel's magnetism

- a vessel's acoustic noise
- a change in water pressure caused by a ship's passing.

The more sophisticated influence mines utilize a combination of the sensors listed above, often in conjunction with a counter that prevents mine actuation until a pre-designated number of ships (actually influences) are detected. This counter allows for mine actuation toward the center of a convoy, vice at the passing of the first sacrificial/expendable ship. The combination of sensors effectively counters such initiatives as non-metallic hulls, degaussed (essentially de-magnetized) ships, and sailing too slowly to trigger a pressure sensor.

Regardless of the type of mechanism used to trigger the mine, all mines are characterized by the position they assume in the water. Sea mines either lay on the sea bottom or are encapsulated in a buoyant shell held in place by a mooring cable.

- Ground mines are laid on the sea bottom in shallow waters, where the bottom of the sea is used to help focus the force of the explosion upward toward the target. The ground mine is particularly difficult to sweep, except to be triggered by influence.

- Moored mines are floating mines, tethered to a weight on the sea bottom, that can be configured with either contact or influence triggering mechanisms. The moored mine adds a significant degree of flexibility to MIW, allowing for the mining of deeper waters than can be mined effectively by bottom mines.

Any moored mine is highly susceptible to sweeping operations. This intrinsic vulnerability can be largely countered by the clustering of mines on a common sinker, or anchor. When the cluster of mines is laid, only one is moored to the preset depth, while the others remain with the sinker. If the moored mine is swept, another is released by the sinker to replace the swept mine. This is particularly effective when used with a delay mechanism, allowing the MCM activity to declare that particular "piece of water" to be cleared of mines. Another modern-day enhancement of the effects of encountering a mine is the physical linking of numerous mines, causing the actuation of one mine to trigger all of the other mines linked to it. Going beyond the establishment of a dangerous area, this provides the area commander with the ability to create a vertical barrier through which nothing can readily pass.*

The U.S. Navy has numerous types of mines. They are primarily air-delivered, but can also be delivered by surface ship or submarine. The three main U.S. programs are⁷ :

- Quickstrike - a program to upgrade a variety of older mines and ordnance with improved, common detection devices. These are deployed in shallow waters.

- Sea-Launched Mobile Mine (SLMM) - launched essentially as a torpedo from a submarine, it propels itself into shallow waters which the submarine cannot reach covertly. When it reaches its pre-determined position it falls to the bottom and becomes a mine.

- CAPTOR - an enCAPsulated TORpedo (a torpedo inserted into a mine case) which is laid in deep waters to function essentially as a moored mine, where it monitors the area with passive sonar to search for submarine contacts, ignoring surface contacts. When it acquires a submarine contact, it shifts to active sonar, then launches a Mk 46 Mod 4 homing torpedo to attack the contact. The CAPTOR is designed primarily for employment at choke points through which enemy submarines must transit to reach open waters. The CAPTOR can be sewn by air, surface ship, or submarine, and is said to have no IFF (Identification Friend or Foe) capability -- significant factors to consider when planning MIW operations.*

Much of the Soviet mine inventory includes simple, proven technology and dated designs. Soviet naval theoreticians have stressed that the mine's main advantages over other naval weapon systems are its simplicity, high reliability, and low production costs.* The moored mines that caused so much havoc in the Persian Gulf in 1987 were of 1908 Russian design, following an 1868 German design.*

Soviet mines, like various other weapons and equipment, are widely sold, distributed, and manufactured throughout the Third World. In addition to the Soviet satellite states, China, Egypt, Finland, Iran, Iraq, Libya, North Korea, and Syria are believed to possess stockpiles of Soviet mines. Some have production lines to manufacture mines of Soviet design. The Soviets have reportedly not exported some of their most sophisticated and

sweep-resistant mines, suggesting that they do not want to arm any clients with mines that the Soviets cannot counter.¹¹

Mine Countermeasures. Although the obvious mine countermeasure is avoidance of known or suspected minefields, any well-planned minefield will preclude this option. MCM are comprised of two separate but complimentary activities:

- minesweeping is the older of the two activities. It is an activity originally developed to counter moored mines. There are two categories of minesweeping: mechanical and influence. A common configuration for mechanical sweeping is for two minesweepers to tow a weighted (depth-stabilized) cable through the water to "snag" a mooring cable. The mooring cable is cut either by serrated blades on the sweep wire or by a cutter with an explosive charge. When the mooring cable is cut, the mine floats to the surface, where it can be destroyed by small arms fire. The more modern sweeping platforms incorporate the ability to simulate (from a safe distance) the influences that trigger a mine, reproducing the acoustic and/or magnetic signature of a vessel with varying degrees of accuracy.

- minehunting is an activity originally developed to counter the use of pressure-activated mines¹². Minehunting uses a combination of means to find mines, including divers, remotely operated vehicles (ROV), and accurate short range sonar by which to find, and destroy with explosives, any mine.

The Navy decided in 1970 to rely on the helicopter as the primary MCM platform.¹² RH-53s are used to tow a "sled" which imitates a ship's acoustic or magnetic characteristics. They can also be used for mechanical sweeps. Less expensive than a MCM ship, an airborne MCM (AMCM) platform affords a rapid response capability and increased safety for the crew. The disadvantages of AMCM include greater support requirements, less time-on-station capability, and less deep water MCM capability than a surface MCMV.

Regardless of the type or quantity of mines seen, or suspected, MCM operations require a reaction that is time-, manpower-, and equipment-intensive.

CHAPTER III

Recent Lessons Learned (?)

"Any Ship Can Be a Minesweeper - Once!"

Sen. John Warner

As the nature of warfare and weaponry evolves, all essential aspects of mine warfare remain constant. The mine has been shown to be a powerful weapon, arguably one of the greatest force multipliers available to the operational commander. It is capable of altering operational-level decisions, often at little or no risk to the perpetrator. A mine is a very cost-effective weapon because, in addition to its low-cost destructive capability, the costs of MCM (considering equipment, time, and altered operational plans) always far exceed the cost of mining. Recent examples of MIW involving the U.S. Navy are described below.

Wonsan - Vice Admiral C. Turner Joy wrote in 1957 that "Wonsan...taught us that we can be denied freedom of movement... through the intelligent use of mines by an alert foe."¹⁴ This represents a particularly embarrassing lesson taught to the United States by the North Koreans. Using junks and sampans to lay approximately 3,500 moored contact and magnetic bottom mines, the North Koreans kept an invasion force of 50,000 men in 250 ships stranded at sea for eight days until a clear path could be swept.¹⁵ The operational impact is clear -- "challenging" the

minefield without an idea of its size or density was not a realistic option, so the invasion force was required to do exactly what the North Korean action dictated -- delay the amphibious assault until a safe route could be cleared.

Haiphong Harbor. Much of the frustration over American involvement grew from the seemingly unlimited supplies provided to the North Vietnamese forces. About 85% of the 2.5 million tons of war materials imported annually by North Vietnam arrived by sea, primarily through the harbor at Haiphong.¹⁶ President Nixon authorized the mining of the harbor, and the operation was conducted by 26 carrier aircraft (A-6 and A-7) in less than one hour. The mines were set to arm themselves after a publicized three-day grace period, during which time several ships left the harbor.¹⁷ After the mines were activated, the nearly 30 ships still in the harbor remained there "for the duration". No others entered. Additional mines were laid during the following eight months, but the mines laid during the original one-hour operation effectively sealed a major port for the next 300 days, until U.S. MCM forces cleared the minefield.

Persian Gulf. The embarrassment suffered by the invasion force at Wonsan was eclipsed in 1987 by images of the U.S. Navy warships, armed with immense offensive and defensive firepower, forced to follow the mine-damaged SS BRIDGETON through the Persian Gulf at five knots. With no U.S. MCM assets in the region, the American guided missile destroyer, cruiser, and frigate providing protective escort to the BRIDGETON were forced

to follow in her wake, since the BRIDGETON was the only ship in the convoy capable of surviving another mine strike.¹⁸

Numerous operational decisions made possible this media-enhanced disaster. Any deployed naval force is a resource-constrained compromise. The threat is analyzed, and available forces are task-organized to maximize the probability of mission success. The perceived threat in the Gulf focused on the Silkworm missiles and the small Iranian gunboats, and the convoy was configured accordingly. The adversary, however, focused on the "poor man's weapon" and successfully attacked the Navy's weakness with an M-08, a moored contact mine of 1908-vintage technology. The master of the 400,000 ton BRIDGETON stated that "...it felt like a 500 ton hammer hit us up forward...you felt the same motion on the ship as you get in big ships in a heavy seaway. They undulate, as the shock wave moves back and up the ship into the bridge and the superstructure...there wasn't much question we had hit a mine."¹⁹

CHAPTER IV

Could This Happen?

"There isn't any place in the world tougher to get into than the carrier battle group....the guy who comes at it better be ready to take significant losses."

Rear Admiral Jeremy D. Taylor²²

The following is presented to highlight the potential of a low-cost, low-risk attack against the United States that would bridge the military and political realms. It is not intended to appear flippant, only to suggest a realistic possibility.

As the combatants returned home from the Persian Gulf region, news analysts focused on the unquestionable validation of defense spending priorities. The critics of expensive military high technology were silenced (some say "converted") across the nation by inordinately low Allied casualties -- until the fleet sailed into Charleston.

During the transit to homeport after the extensive combat deployment, the carrier battle group (CVBG) conducted a typical variety of anti-submarine warfare (ASW), anti-air warfare (AAW), and anti-surface warfare (ASUW) exercises. As the Mayport-based elements of the CVBG broke formation seven miles off the East Coast to sail south, an underwater explosion took place. There

were no submarine contacts. Six minutes after that determination, a second and then a third explosion blew up a Cimarron-class oiler. The CVBG had entered a minefield. Strong currents caused dangerous drifting, and required the group to reverse course to slowly pull out from the minefield.

As huge crowds of family, friends, and reporters began to gather in and around the Charleston and Mayport Naval Bases for the anticipated arrival of the CVBG later that day, those 14 ships cautiously extricated themselves from the minefield while waiting for shore-based RH-53 minehunters and MHCs (coastal minehunters). Over the next four days, 18 mines were found.

All ships were docked at homeport within 36 hours of the minestrikes. Traffic from any Middle Eastern state had been declared SIV (Special Interest Vessel) by the Coast Guard at the outbreak of hostilities, and none had been observed in the region during the previous two weeks. Although two different radical groups immediately claimed responsibility for the mining, the final report was inconclusive. It could only presume that any one of at least 30 different merchant vessels under the flags of three different countries with reason to support the recently conquered Middle Eastern power was chartered to sail slowly along the southern East Coast. Under cover of darkness ten cylinders, each five feet long and 21 inches wide, were pushed overboard at one position and eleven more three miles away.

Only three mines exploded, causing slight damage to a frigate and sinking the oiler, killing eleven sailors. Further

analysis determined the second explosion near the oiler to have been a sympathetic explosion, caused by the first mine activation, reinforcing the conclusion that the mines were laid by amateurs.

The morning following the release of the report, the Secretary of Defense was questioned on C-SPAN by a congressional subcommittee. His answers were repeatedly interrupted by increasingly probing, hostile questions about the Navy's ability to protect itself and merchant shipping from mines. When asked if it was true that, marshalling all its MCM assets, the U.S. Navy could keep only two major ports cleared²¹, he answered "yes", to a newly embittered nation.

CHAPTER V

Is Our Mine Warfare Posture Bankrupt?

Yes. And No.

Even if the Department of Defense succeeds in getting all the MCM ships and helicopters it has requested, the U.S. would still have only enough indigenous minesweeping capability to "clear passage to a maximum of five mined ports."²²

CAPT John Moore (Ret.)

Editor, Jane's Fighting Ships

YES. The MIW threat is more complicated than a comparison of mine inventories and MCM capabilities -- it has been described as a MIW "threat triad" of Soviet capabilities, U.S. funding deficiencies, and the U.S. Navy's perception of MIW.²³

The vast majority of U.S. shipping goes through a handful of ports, and the sea lines of communication (SLOCs) that are so vital to all of NATO stretch from these ports to those in Europe. The ability to rapidly reinforce NATO forces through these ports may largely determine the outcome of any major European conflict. Rapid reinforcement requires a forward presence -- yet most U.S. MCMV are in the Naval Reserve Force (NRF). Any future major European conflict may be decided before the Reserve Components can be mobilized.

U.S. MCM planning relies heavily on Japanese and NATO MCM assets -- the same assets that would be stretched to the limit trying to keep some vital fraction of their own ports clear. It is possible that, for example, our European allies might consider coastal mining a domestic crisis rather than a NATO crisis, and employ their MCM assets accordingly.

As are many other military warfare areas, MIW is demanding and dangerous. It is not, however, glamorous. Those involved will never experience closing with and destroying an enemy. Career-wise, an assignment in MIW is not along any of the traditional paths to success, unless it is command of a MCMV. The MCMV do not go fast or fire exotic weapons. MIW is often seen as a weapon of the weak against the strong. "The weapon that waits...and waits" and "the poor man's weapon". This is hardly material for recruiting posters. More significantly, however, MIW is hardly the type of warfare specialty that inspires political support to ensure that force enhancement programs are well-designed and safely funded.²⁴ In the Navy's Report to the Congress - FY1991, the list of "budget priorities" makes no mention of MIW.²⁵

NO. As stated previously, the Navy's MIW posture is an easy target for superficial criticism. RH-53s? Clearly capable -- of clearing narrow paths. If a C-5 cargo plane brings them to the theater, or if a helicopter support ship is available.

The new AVENGER class? It is certainly among the world's most capable MCMV -- but there are only six in the inventory, and all

are expected to enter the NRF after a short (12-18 months) period in the active component.

These views are common throughout the Navy. But the facts show that RH-53s can perform MCM operations, and can be moved rapidly by C-5 to a distant crisis site. This is an operational capability that also sends a strong message to the world about U.S. forward deployment and rapid response capabilities. The MCM capabilities of the RH-53 cannot match those of an AVENGER, but for the price of one AVENGER, the Navy can procure roughly four RH-53s.²⁶ In a crisis, only safe paths must be cleared, not entire minefields.

The idea of relying so heavily on NATO MCM assets is also easy to criticize -- in the context of the opening stages of World War III. But far more likely are regional crises not directly involving the Soviets. The NATO forces are well trained and equipped to respond rapidly to handle or assist in such contingencies. In a major conflict, it is in the best interests of each of the Allies to employ MCM assets according to NATO priorities. For any nation to keep its own ports clear at the expense of supporting theater-wide NATO reinforcement operations would be dangerously myopic.

The bulk of the U.S. MCM capabilities are in the NRF -- what message does that send about the ability to go to war tomorrow? A misleading message. The reserve component MCMV are manned by composite active duty and reserve crews. Would the Navy be better served by an active component, forward deployed MCMV force?

Probably not, considering not only the cost but also the fact that much of the NRF peacetime duties involve channel surveys and harbor conditioning (removing refrigerators, discarded 55 gallon drums, or any other suspicious findings). By carefully surveying and mapping the sea bottom for mine-like objects, subsequent surveys can readily identify any new findings. This will allow the responsible commander to conduct the appropriate MCM without the wasted time and effort of "groping for refrigerators" at the bottom of a harbor after hostilities commence. Harbor conditioning during peacetime enhances wartime capabilities to transit key waterways.

The commissioning of the first AVENGER-class MCMV took place a quarter century after the last large minesweeper commissioning. After such a period of indifference, however, the Navy currently has two major MCMV programs -- one for 17 MHC based on the Italian Lerici-class minesweepers/hunters, and one for 14 AVENGER-class MCMV.⁸⁷ This, along with RH-53 enhancement programs, changes the picture significantly, even in the context of a major conflict.

Arguably the most cost-effective program for MCM force multiplication is the Craft of Opportunity Program (COOP). The craft are procured at little or no cost to the Navy from sources ranging from surplus assets to Internal Revenue Service and Drug Enforcement Agency seizures. The objective of this program is to outfit an estimated 88 craft to function in wartime as a widely dispersed auxiliary MCM force in 22 harbors. This involves

equipping YP-class (yard patrol) naval craft no longer required by the U.S. Naval Academy, fishing trawlers, and other similar craft with the necessary equipment, such as sidescan minehunting sonars and sweep cables, to provide for basic MCM capabilities in times of crisis²⁰. Although COOP craft cannot match the capabilities of a dedicated MCMV and are more affected by adverse weather, the program provides a significant enhancement to the U.S. harbor break-out capabilities as well as the safety of harbor approaches.

CHAPTER VI

Conclusions and Recommendations

There are several factual statements that suggest that the Navy's MIW posture is bankrupt:

- MIW is a serious threat. Regardless of the size or type of minefield encountered, freedom of maneuver is influenced by the enemy. All traffic, both merchant vessel and warship, is at best either stopped, restricted, or channelized.

- MCM capabilities are inadequate for the Soviet threat. No one seriously doubts that U.S., as well as NATO, MCM assets would be almost immediately overwhelmed by any serious Soviet mining campaign. MCM assets are very capable, but also very limited compared to the threat.

- Money can fix this, but that money is needed for higher-priority programs. Given the capabilities of the mines in the inventory, the delivery systems, and the MCMV, the United States can build up its inventory of MIW assets to match any threat -- if it were willing and able to fund such programs.

On closer examination, however, the Navy's MIW posture seems quite different. It is not bankrupt. It appears quite vital and forward-thinking. The Navy has developed mines that provide low cost, reliable, highly-destructive capabilities and are readily deployable and employable worldwide on short notice. It has

developed, in the AVENGER, what some consider the most capable MCMV in the world. This large ocean-going MCMV employs state-of-the-art sonar and navigation systems to maximize the effectiveness of the sweeping and hunting equipment, and can be operated anywhere from coastal waterways to distant crisis points. The first of the 14 AVENGERS programmed was commissioned in 1987. There are currently six commissioned, with the remaining eight expected over the next several years. Delivery of the first of the 17 MHC programmed is expected in the summer of 1991.

The Navy employs reserve-component MCM assets in a relatively low cost manner that virtually guarantees high returns in a crisis. The channel survey and conditioning operations performed by the NRF are required during peacetime to avoid "groping for refrigerators" during a crisis. Its COOP, in conjunction with channel surveys, provides the potential for a wartime cost-effectiveness example against which all other such programs may some day be judged.

My recommendations are:

- Expand and exploit the COOP program. Apply the resources necessary now to give the operational commander in wartime the support of a simple, pre-positioned, rudimentary but reliable minesweeping kit that is easily installed and operated on a wide variety of common craft. Although COOP is a national program with no anticipated external requirements, the feasibility of a NATO standard kit should be explored to allow for savings in

development and production as well as the potential for interoperability. The kits should be pre-positioned in sufficient quantities to allow for losses as well as to permit an expansion of the size of the program if required. The use of heavy sealift to transport the COOP craft to distant, non-NATO crisis sites would allow for the expansion of this program beyond our own harbors. If MCM forces must be decremented in the future, one area that should be explored is to decrease the procurement quantities of the MHC and use part of the savings to increase the COOP.

- Protect the role of the Naval Reserve Force in MCM. A forward deployed MCM force would be an expensive addition to the force structure that may provide less readiness than is provided now by the NRF. The channel survey and conditioning performed by the NRF provide a vital service to all traffic, as well as ensuring that the active fleet has a core of fully trained and experienced specialists in MIW available in a crisis. There are few areas where peacetime expenditures provide so much enhancement to the force readiness posture in relation to the cost. With the current budgetary pressures, I would expect the role of the NRF to expand in the future, especially in light of the MIW being conducted in Operation Desert Storm.

- Expand the awareness of MIW throughout the officer corps. Institutionalize the value of an exposure to MIW for all line officers. Numerous types of mines (ground, moored, and floating) are currently being encountered in the Persian Gulf region in

Operation Desert Storm. Anyone operating in the region must understand the capabilities and limitations of MIW to be effective. MIW, both mining and MCM operations, requires careful planning to maximize the potential results. Planning involves compromise, and the trade-offs involved must be thoroughly understood. Operational planning that incorporates any aspect of MIW without carefully considering types of minefields and munitions, methods of delivery, and the effect of each option on both friendly and enemy courses of action, is dangerously shortsighted.

Any warfare at sea, from regional crisis to WWII, all but guarantees mine warfare. Those who will sail into Hara's Way in the next crisis should learn everything possible now about MIW, while the lessons are cheap.

NOTES

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